APPENDIX "J"

Procedures for Implementation of Regulations Covering Stage II Vapor Recovery Systems for Gasoline Dispensing Facilities

a. PURPOSE.

The purpose of this document is to prescribe the procedures for training, systems approval, maintenance, operation, testing, inspection, recordkeeping, and reporting for Gasoline Dispensing Facilities required to be equipped with Stage II vapor recovery systems.

b. BACKGROUND.

1. The implementation procedures outlined in this document are based on those specified in the U.S. Environmental Protection Agency (EPA) Office of Air Quality Planning and Standards and Office of Air and Radiation Guideline Series documents. In cases where the definitions, standards, and other provisions of the EPA guideline documents differ from this document or Regulation No. 24, **"Control of Volatile Organic Compound Emissions"** [hereinafter called "the regulation"], this document and the regulation shall take precedence. The use of test methods and procedures not specified in this document is acceptable if approved by the Department within the context of the provisions of subsection c., below.

2. In order for the State of Delaware to fulfill its obligations under the Federal Clean Air Act, state regulations are required to be approved by the EPA.

3. Where state regulations specify that procedures or methods shall be approved by, acceptable to or determined by the Department, or specifically provide for decisions to be made by the Department, or other similar phrasing, it may be necessary to have such actions (approvals, determinations, exemptions, exclusions, or decisions) reviewed and confirmed as acceptable or approved by EPA in order to make them federally enforceable.

4. It has been determined, in accordance with EPA regulations and policy, that this document is to be submitted to EPA and, upon approval, become part of the State Implementation Plan. Accordingly, any amendments to this document shall be approved through the same administrative process.

c. GENERAL REFERENCES.

1. Regulation No. 24, **"Control of Volatile Organic Compound Emissions"**.

2. "Technical Guidance - Stage II Vapor Recovery Systems for Control of Vehicle Refueling Emissions at Gasoline Dispensing Facilities", EPA-450/3-91-022a and b, November, 1991.

3. "Enforcement Guidance for Stage II Vehicle Refueling Control Programs", U.S. Environmental Protection Agency, Office of Air and Radiation, October, 1991.

4. "Gasoline Facilities Phase I and II Technical Manual", **Appendix D**, CARB Compliance Division, Revised April, 1992.

d. LOCATION OF REFERENCED DOCUMENTS. The documents referenced above and any others that may be referenced throughout this document are available from the Department. A nominal fee is required.

e. RECISION. This document supersedes any previously issued documents relative to this matter, except for regulations.

f. INSTRUCTIONS.

1. Applicability. This document contains procedures to be used to comply with the regulations requiring Stage II vapor recovery system operator training, equipment approval, testing, inspection, maintenance, and all associated recordkeeping and reporting. The owner of the Stage II vapor recovery system (hereinafter called a "Stage II system"), installed at a gasoline dispensing facility (hereinafter called a "facility"), as required by Regulation No. 24 and Regulation No. 2, has the ultimate responsibility for compliance with the requirements of subsection f.2., below. Stage II systems must be installed at applicable facilities in all three counties in the State of Delaware: New Castle, Kent and Sussex.

2. Procedures.

i. Stage II System Operation and Maintenance Training.

A. At least one representative (an owner, facility manager, or designated employee) from each facility, or facilities under common ownership, shall attend a training program on the operation and maintenance requirements of the Stage II equipment that is selected for installation on their facility premises. Verification, such as a certificate of attendance from

the training program, shall be obtained by the attendee within three (3) months of the installation of the Stage II system. The representative that completed the training is then responsible for informing all facility employees about the operation and maintenance of the Stage II system. If the representative who received the initial training/certificate leaves that facility, or the company owning several facilities, another representative shall take and successfully complete the training within three (3) months.

B. Training shall include, but need not be limited to, the following subjects:

1. Purposes and effects of the Stage II vapor control program.

2. Equipment operation and function specific to their facility's equipment.

3. Maintenance schedules and requirements for the facility's equipment.

4. Equipment warranties.

5. Equipment manufacturer contracts (names, addresses, and phone numbers) for parts and service.

C. Acceptable forms of training can include equipment manufacturer's seminars, classes or workshops offered by accredited institutions, or any other training approved by the Department. Facility owners are encouraged to request and solicit by contract training from the manufacturer or the contractor who will install the Stage II system at their facility.

ii. Facility Permitting and Stage II System Approval.

A. Owners of Stage II vapor recovery systems shall submit to the Department, no later than 60 days prior to installation, a Stage II Permit application, in accordance with Regulation No. 2. Only those system

configurations as approved in accordance with the provisions of **Appendix "J1"**, will be approved. The Permit shall be placed in the facility file and kept on the premises of the facility at all times.

B. Other Requirements: Applicable facilities shall be in compliance with any other regulations, guidelines, or requirements which affect the regulated facility's operations, including Stage I requirements.

iii. Stage II Requirements for Installation and Testing

A. Owners of Stage II vapor recovery systems shall verify proper installation and function of the entire Stage II vapor recovery system when it is fully installed and ready for operation, by performing the tests listed below:

1. Pressure Decay/Leak Test, with a Vapor Space Tie Test, where applicable (see **Appendices "J2" and "J3"**).

2. Dynamic Backpressure (Dry) Test/Liquid Blockage (Wet) Test (see **Appendix "J3"**).

3. Testing to ensure proper functioning of nozzle automatic shut-off mechanisms and flow prohibiting mechanisms, where applicable.

4. Other applicable tests specific to a Stage II system, when approved by the Department.

The Stage II system shall be tested and verified as functioning properly before it is made available to the public or to facility personnel for use. The owner of the Stage II system shall notify the Department at least ten (10) days prior to the testing of the Stage II system unless permission is granted to the contrary. It is recommended, for the protection of the facility owner, that appropriate testing be performed to verify proper installation of the underground piping before the aboveground equipment is installed.

B. The owner of the Stage II system shall submit a copy

of all Stage II system test failures, as required in subsection A, above, to the Department no later than ten (10) days after the tests have been performed. The test results shall be dated and shall note the installing and test companies' names, addresses, and phone numbers.

C. The owner of a Stage II system shall perform once every five (5) years a Pressure Decay/Leak Test and a Dynamic Backpressure (Dry) Test annually on the entire Vapor Recovery System (according to the procedures in **Appendices "J2" and "J3"**). Any or all test(s) may be required after a major system replacement or modification, or upon request of the Department after a malfunction of Stage II system has been identified. The owner of the Stage II system shall notify the Department at least ten (10) days prior to the testing of the Stage II system unless permission is granted to the contrary. Test failures shall be reported to the Department within twenty-four (24) hours.

iv. Replacement Parts for Stage II Systems. Only those rebuilt or aftermarket parts as listed in **Appendix "J1"** (except for remote check valves and dual vapor recovery hoses) shall be used as replacement parts on Stage II vapor recovery systems, such that the system's original efficiency or durability is not degraded.

v. Maintenance Inspections of Stage II Systems.

A. The Stage II system owner and operator shall perform routine maintenance inspections of the Stage II system on a daily basis, and record the inspection results. Daily inspections shall consist of, but not be limited to, inspection of the Stage II system for the equipment defects as listed below. The presence of any equipment defect and the corrective action taken shall also be recorded in the maintenance record as specified below in subsection f.2.vii. of this document.

1. A vapor return line that is crimped, flattened, blocked, or that has any hole or slit that allows

vapors to leak out.

2. A nozzle bellows that has any hole large enough to allow a 1/4 inch diameter cylindrical rod to pass through it, or any slit one inch or more in length.

3. A nozzle faceplate or facecone that is torn or missing over 25% of its surface.

4. A nozzle with no automatic overfill control mechanism, or an inoperable overfill control mechanism.

5. An inoperable or malfunctioning vapor processing unit. Defects of the process unit include, but are not limited to, leaking return lines, intermittent process interruptions, and low return pressure.

B. The Stage II system owner and operator shall conspicuously post an "Out of Order" sign on any nozzle associated with any aboveground part of the Stage II system which is found to be defective. The defective equipment shall be taken out of service until it has been repaired or replaced.

vi. Operating Instructions for Users of Stage II Systems

A. The facility owner and operator shall conspicuously post operating instructions for the vapor recovery system in the gasoline dispensing area, which include the following:

1. A clear description of how to correctly dispense gasoline with the vapor recovery nozzles.

2. A warning that repeated attempts to continue dispensing gasoline after the system has indicated that the vehicle fuel tank is full (by automatically shutting off) may result in spillage or recirculation of gasoline.

3. A telephone number to report problems experienced with the vapor recovery system to the Department. This number may be posted in the store so long as it is conspicuously displayed.

B. The format and content of the instructions shall be approved by the Department. The Department also reserves the right to supply instructional signs, at a nominal cost to the facility owner, for placement in the gasoline dispensing areas at each facility.

vii. Verification of Facility Compliance Through Recordkeeping. Stage II system owners and operators shall maintain various types of compliance records as listed below in subsections A through F. Records shall be kept in a form and manner acceptable to the Department, unless forms are supplied by the Department for a specific purpose. The records shall be kept updated and maintained on the facility premises in an easily accessible location for review by the Department. The Stage II system owner has the ultimate responsibility to ensure that the appropriate records are accurately maintained.

A. Station Permitting/Stage II System Approval. A copy of the Stage II System application form and permit shall be maintained permanently on the facility premises in the facility file.

B. Stage II System Installation and Testing Results. The Stage II system shall meet or exceed the requirements of the tests discussed in subsection f.2.iii., above. The test results shall be dated, and shall note the installing and test companies' names, addresses, and phone numbers. These records shall be kept on file until they are replaced with new test results verifying proper functioning of the Stage II system.

C. Stage II System Maintenance Records. Any maintenance conducted on any part of a regulated facility's system shall be required to be logged on a maintenance record. This maintenance record shall include a general part description, the date repaired or replaced, the replacement part manufacturer's information, and a description of the problem and

solution. These records shall be kept on file for at least three (3) years.

D. Inspection Records. A file shall be maintained of all inspection reports issued by the Department, records of daily self-inspections, and records of monthly self-inspections. The inspection records shall be kept on file for at least three (3) years, and be organized chronologically.

E. Compliance Records. A file shall be maintained of all compliance records including warning, notices of violations, and other compliance records issued by the Department to the facility. The compliance file shall be maintained separate from the inspection file. The compliance records shall be kept on file for at least three (3) years, and be organized chronologically.

F. Training Certification. Proof of attendance and completion of a training program as specified in subsection f.2.i.A. of this document shall be maintained and filed in the compliance records file specified in subsection f.2.vii.E. This does not apply to the records of an employee who is no longer in service for at least one (1) year.

SUB-APPENDICES

J1 Certified Stage II Vapor Recovery Systems

J2 Pressure Decay/Leak Test Procedure

J3 Dynamic Backpressure (Dry) Test/Liquid Blockage (Wet) Test Procedure

APPENDIX "J1"

Certified Stage II Vapor Recovery Systems

A Stage II system will be an approved system if it is certified by the California Air Resources Board (CARB) and utilizes coaxial hoses (instead of dual vapor recovery hoses) and check valves in the nozzle for balance type systems (instead of remote check valves). If a Stage II system is certified by CARB, an Executive Order is written for that system. The order specifies the conditions which must be met by any Stage II system installed under that certification. The specifications may include the plumbing system, an equipment list, the vapor hose configuration, and the maximum allowable pressure drop through the system.

The list of CARB certified Stage II systems and replacement parts is continually being updated; therefore, facilities are directed to obtain the most recent copy of the list from the Department before purchasing Stage II vapor recovery equipment. A nominal fee shall be required.

APPENDIX "J2"

Pressure Decay/Leak Test Procedure forVerification of Proper Functioning of Stage I & Stage II Vapor Recovery Equipment

a. INTRODUCTION. This procedure is applicable to facilities that are required to recover vapors emitted during the transfer of gasoline by installing and operating Stage I and Stage II vapor recovery equipment. It is used to determine compliance with Stage I and Stage II of the Regulations for the Control of Volatile Organic Compound Emissions. Section 26 requires vapor recovery during the truck delivery of fuel to stationary storage tanks (Stage I vapor control). Air aspirated into the fuel during Stage I deliveries prevents compliance with Section 26 of the regulations. Vapor leakage from adjacent tanks with a vapor manifold to the tank receiving fuel also precludes compliance. This will not happen if the system is leak tight. Section 36 requires that Stage II vapor recovery systems are at least 95% effective in recovering gasoline vapors, and requires the vapor recovery nozzle backpressure shut-off mechanisms not malfunction in any way. This procedure is used to check for the proper functioning of the Stage II system and shut-off mechanisms, and is also used to identify equipment defects which are listed in **Appendix "J"**.

b. PREREQUISITES TO TESTING. The following requirements must be met before a valid test may be performed:

1. The Department Must Be Notified - The appropriate office of the Department must be contacted at least two working days prior to the testing of the stage II vapor recovery system. Tests may or may not be witnessed by a Department personnel, however, if the Department is not notified of this test or any of the other required tests, then this test or any other required test may be declared invalid, in which case a retest will be required.

2. Minimum Tank Ullage - The ullage (vapor space) in each tank being tested must be at least 10% of the tank's capacity, but in no case less than 300 gallons per tank. If the tanks are manifolded, each tank must meet the minimum ullage requirements described above.

3. Maximum Tank Ullage - There is no maximum tank ullage requirement. However, since the required test duration is directly proportional to the amount of tank ullage, it is recommended that the total tank ullage be kept as close as possible to the minimum tank ullage requirements to preclude excessively long tests.

4. Condition Of The Vapor Recovery System - The complete vapor recovery system must be installed and intact during the test. If the installation includes a Stage II vapor recovery system, all hoses, nozzles, fittings, valves, and other system components must be installed as if the system were to be placed

into service. All system components must be free of all visible defects such as torn or punctured bellows, loose or torn faceplates, or defective check valves. Plugging the vapor return plumbing where a leaking vapor recovery nozzle or remote check valve has been discovered is not allowed.

5. Restrictions On Gasoline Transfer Operations - Transfers of gasoline into the storage tanks within one (1) hour prior to the test are prohibited. In addition, dispensing of gasoline is not allowed during the test.

c. EQUIPMENT. The following equipment will be needed to perform this test. (Refer to the schematic presented in **Figure 1** for a typical set-up).

1. A bottle of compressed gaseous nitrogen and pressure regulators capable of regulating final downstream pressure to 1.0 pound per square inch gauge (psig) is required. Use assorted valves, fittings, and pressure tubing as necessary. A means of providing a grounding path from the bottle of compressed nitrogen is required. The bottle shall be grounded for safety. It is recommended that the tubing be flexible metal tubing or non-metal tubing that incorporates a grounding path throughout its length. A pressure relief device must also be installed prior to testing. The pressure relief device must be adjusted to vent at one pound per square inch gauge (27.7 inches water column gauge).

WARNINGS:

i. Attempting the pressure decay test without a pressure relief device may result in over-pressurizing the system, which may create a hazardous condition and may cause damage to the underground storage tanks, associated piping, and other system components.

ii. The nitrogen bottle must be securely fastened to a large, stationary object at all times. A compressed gas cylinder which falls and is damaged can easily become a lethal projectile.

2. An accurate device for measuring pressure, such as a water manometer (preferable) or a Magnehelic gauge (or equivalent), is required to measure the system pressure. This device must be graduated in increments of one tenth (0.1) of an inch of water column pressure.

3. A stopwatch accurate to within 1 second.

d. TEST PROCEDURE

1. Determine the ullage of the underground storage tank (or tanks, if manifolded). Measure the gasoline gallonage in the underground storage tank(s). Calculate the ullage space for the storage tank(s) by subtracting the gasoline gallonage present from the tank capacity(ies). Note the ullage and actual tank ullage must meet the minimum tank ullage criteria specified above in Section b.2.

2. Calculate the required test duration by multiplying the total ullage (in thousand gallons) by 5.0. Record the resulting required test time (in minutes) on a data form acceptable to the Department.

3. Install the pressure relief device, grounding wire, fittings, tubing, and equipment needed to pressurize and to monitor the system vapor space (see **Figure 1**). Nitrogen can be introduced into the system through the storage tank vent pipe or through the vapor return piping.

4. For manifolded systems, install the pressure relief safety valve, set at one psig (27.7 inches of water), over the opening of the storage tank vents and cap the remaining storage tank vents. (Manifolding the vent line is prohibited since this interferes with the check of underground vapor manifolds). For non-manifolded systems, test each product vapor recovery system separately with the pressure relief safety valve installed on the vent of the storage tank being tested. (Alternative setups may be used as long as they do not interfere with the objectives of the test and have prior Department approval.)

5. Remove the Stage I adapter cap(s) on the vapor return drybreak valve(s) of the underground storage tank(s). The system must pass the Pressure Decay/Leak Test with the drybreak cap(s) removed. It is permissible for the tank fill cap(s) to be in place on the fill adapter(s) during the test.

6. With no dispensing taking place, begin pressurizing the vapor system (or subsystem for individual vapor return line systems) to 11 inches water column gauge (inches wcg). Let the system sit for fifteen minutes to allow vapor pressure stabilization in the tank(s). Check the vent cap assembly(ies), nitrogen connector assembly, nozzles, vapor return adapter(s), and all accessible vapor connections using leak detecting solution to verify that the test equipment is leak tight. If after fifteen minutes the ullage pressure is still about 10 inches wcg, reduce the system pressure to 10.0 inches wcg. If the ullage pressure is below 10 inches wcg, then again pressurize the vapor system to 10.0 inches wcg.

7. With the system pressurized to 10.0 inches wcg, begin the test. Start the stopwatch and record the time the test began on a data form acceptable to the

Department.

8. Intermediate readings may be taken to monitor the performance of the system, but the final system pressure reading must be taken at the end of the required test duration calculated above in Step d.2., and recorded on a data form acceptable to the Department. Refer to the test standards specified below in Section e. to determine the acceptability of the final system pressure result.

9. While the system is still pressurized, check the integrity of the automatic backpressure relief device on each nozzle connected to the vapor recovery system being tested by pulling on the nozzle's trigger. The backpressure relief device is acceptable if there is not resistance when the nozzle's trigger is pulled. Nozzles with defective backpressure relief devices shall be replaced.

10. At the time of installation, following the Pressure Decay/Leak Test and with the tank(s) still pressurized, complete the following Vapor Space Tie Test:

    i. For systems with vapor manifolded tanks, depress the Stage I drybreak valve of each tank to see if gases are released under pressure. (A tank where gases are not released under pressure is not manifolded to the Stage II vapor piping as required by Department regulations).

    ii. For non-manifolded systems, depress the drybreak valve of each tank to see if the product in the storage tank matches the product dispensed by the nozzles where checks were made of the backpressure shut-off mechanisms. This is a check to see if the underground vapor piping is crossed and goes to the wrong storage tanks. If crossed piping is indicated, verify by sending five (5) gallons of liquid down the Stage II piping while a second person listens for splashing at the tank with the drybreak open (see Liquid Blockage (Wet) Test Procedure which follows this procedure).

    iii. Remove the caps of the fill risers of the storage tanks. If it appears that any gasket is damaged or missing, it must be replaced and the fill adapter tightened.

11. If the system failed to meet the criteria for passage set forth below in Section e., repressurize the system and check all accessible vapor connections using leak detecting solution. If vapor leaks in the system are encountered, repair or replace the defective component(s) and repeat the Pressure Decay/Leak

Test (Steps d.6. through d.8.).

12. Depressurize the system by carefully removing the vent cap assembly(ies). Allow any remaining pressure to be relieved through the vent pipes(s).

13. If the vapor recovery system utilizes individual vapor return lines for each gasoline product or each underground storage tank, repeat the entire Pressure Decay/Leak Test for each vapor return system (Steps d.1. through d.12.).

e. TEST STANDARDS. The minimum allowable pressure decay time from 10.0 to 9.0 inches wcg shall be 5.0 minutes per 1000 gallons ullage. This means that from an initial pressure of 10.0 inches wcg, if the system pressure reading at the end of the required test duration (as calculated using the methodology specified in Section d.2.) is less than 9.0 inches wcg, the system fails.

f. REPORTING REQUIREMENTS. The test results of the Pressure Decay/Leak Test procedure must be submitted to the appropriate office of the Department within ten (10) days of the day the tests were performed. It is the ultimate responsibility of the owner of the facility to make sure that the necessary documentation is submitted to the Department; however, the Department will accept test documentation directly from the contractor performing the tests. It is also the owner's responsibility to see that the test results are maintained in a file at the gasoline dispensing facility.

APPENDIX "J3"

Dynamic Backpressure (Dry) Test and Liquid Blockage (Wet) Test Procedure for Verification of Proper Functioning of Stage II Vapor Balance Recovery Systems

a. INTRODUCTION. This procedure is used to determine compliance with the emission standard in Section 36 of the Regulations for the Control of Volatile Organic Compound Emissions. Backpressures due to flow resistances in the vapor return nozzles, hoses, dispensers, and piping are often found to be the primary cause of vapor losses from the balance vapor recovery systems. All the applicable California Air Resources Board (CARB) Executive Orders specify specific flow resistance limitations that are included in this procedure. Failure of a Stage II system to meet the flow resistance limitations is a violation of Section 36 of the regulations which requires that only certified systems be installed. Furthermore, this procedure is used to detect prohibited equipment defects listed in **Appendix "J"** entitled, "Procedures for Implementation of Regulations Covering Stage II Vapor Recovery Systems for Gasoline Dispensing Facilities", and determine if the underground vapor piping configuration complies with the applicable CARB Executive Orders as required by Section 36 and as referenced in **Appendix "J"**. The Liquid Blockage (Wet) Test described in this test procedure is also applicable for aspirator-assist Stage II vapor recovery systems.

This procedure consists of two separate tests which must be conducted sequentially in the order indicated below:

1. Dynamic Backpressure (Dry) Test: This test is used to determine the pressure drop (flow resistance) through balance Stage II vapor recovery systems (including nozzles, vapor hose, swivels, dispenser piping, and underground piping) at prescribed flow rates. The test method consists of flowing gaseous nitrogen through a calibrated test panel into the vapor recovery system at various flow rates to simulate the backpressure created during vehicle refueling. The resulting backpressures are measured near the nozzle faceplate using a pressure gauge and compared with CARB certification criteria.

2. Liquid Blockage (Wet) Test: This test is used to determine if the piping configuration is correct and to detect low points in the piping where the accumulation of liquid condensate may cause blockages which restrict the flow of vapors and thus decrease the system's vapor collection efficiency. The test method consists of introducing gasoline into the vapor piping at the dispenser. When the gasoline can be heard dropping into the appropriate tank, enough gasoline is deemed to have been added to create a blockage should a low point or other restriction be present. Gaseous nitrogen is introduced into the vapor piping at a rate of 60 standard cubic feet per hour (SCFH). A liquid blockage is indicated either by the needle pegging on the

pressure gauge and/or wild pulsing of the needle, or a reading in excess of 0.45 inches of water gauge (inches wcg) backpressure at a flow of 60 SCFH of nitrogen.

This test is required to be performed after the entire Stage II system has been installed. Nevertheless, it is recommended for new construction that the contractor conduct this blockage test both before and after the vapor recovery piping is covered to minimize the extensive effort and cost associated with repairing the piping system should the vapor recovery system fail the test.

b. PREREQUISITES TO TESTING. The following requirements must be met before a valid test can be performed:

1. The Department Must Be Notified - The Department must be contacted at least two working days prior to the testing of the Stage II system. The test may or may not be witnessed by a Department personnel; however, if the Department is not notified of this test or any other required test, then this test or other required tests may be declared invalid.

2. Condition Of The Vapor Recovery System - The vapor recovery system must be proven leak tight with the Pressure Decay/Leak Test required by the provisions of Section 36 of the regulations, and described in this Appendix, prior to conducting this test. There can be no alteration of the vapor recovery system between the time the Pressure Decay/Leak Test is conducted and the Dynamic Backpressure (Dry) and Liquid Blockage (Wet) Tests are run.

3. Restriction Of Gasoline Dispensing Operations - During testing of a given product, no dispensing of that product will be allowed. If the vapor spaces of the underground storage tanks are manifolded, dispensing of gasoline from the entire station shall be prohibited during testing.

c. EQUIPMENT. The following equipment will be needed to perform the Dynamic Backpressure (Dry) Test and the Liquid Blockage (Wet) Test:

1. A bottle of gaseous nitrogen and pressure regulators capable of regulating final downstream pressure to 5.0 pounds per square inch gauge (psig) are required. Use assorted valves, fittings, and pressure tubing as necessary. A means of providing a grounding path from the bottle of compressed nitrogen must be employed. The bottle shall be grounded for safety. It is recommended that the tubing be flexible metal tubing or non-metallic tubing that incorporates a grounding path throughout its length.

A pressure relief valve must be installed prior to testing. Attach it to the vapor piping or a storage tank vent within the piping system. The pressure

relief valve must be adjusted to release at one psig (27.7 inches of water column gauge). (The diaphragms in balance system nozzles are not designed to withstand pressures exceeding one psig and may be accidently ruptured if this procedure is not followed.)

***WARNING* - The nitrogen bottle must be securely fastened to a large, stationary object at all times. A compressed gas cylinder which falls and is damaged can easily become a lethal projectile.**

2. A flow regulator is required that is capable of delivering nitrogen at very low pressure and at measured flow rates of 20, 60, and 100 SCFH.

3. A test panel as shown in **Figure 2** must be used for testing balance system vapor flow restrictions. The panel consists of a section of vehicle fillpipe, attached pressure gauges, a drain to drain off gasoline liquid that spills into fillpipe from the nozzle fill spout, a plug in the back through which nitrogen enters the fill neck, a flow gauge to adjust nitrogen flow control valves and attachments to connect the nitrogen bottle. The pressure drop through the Stage II system is determined using a gauge capable of accurately measuring pressures from 0 to 1 inch of water column gauge (inches wcg) and readable in increments of 0.01 inches wcg.

   The gauge is used to measure backpressure before and after the gasoline is introduced. Pressure is to be sensed through a port, perpendicular to the direction of flow, located as close as possible to the vapor piping. An additional simultaneous-reading gauge with a 0 to 10 inches wcg range is desirable to quantify excessive flow resistance.

d. TEST PROCEDURES

1. Dynamic Backpressure (Dry) Test: The farthest dispensing nozzle from the underground tanks for each product grade shall be tested using the following procedure unless otherwise instructed by the Department.

   i. Prop open only the Stage I drybreak valve at the tank with the same product as the nozzle being tested. (The pressure drop is measured through the nozzle, vapor hoses, dispenser, vapor piping, and through the tank to the Stage I drybreak. This comes close to duplicating the actual flow resistances that occur during normal operations.) Set up traffic barriers in the vicinity of the drybreak valve to preclude the approach of potential ignition sources.

   ii. For manifold systems, install the pressure relief safety valve,

set at one psig (27.7 inches of water), over the opening of one of the storage tank vents and cap the remaining storage tank vents. (Manifolding the tank vent lines is prohibited.) For non-manifolded systems, test each product vapor recovery system separately with the pressure relief safety valve installed on the vent of the storage tank being tested. (Alternative setups may be used as long as they do not interfere with the objectives of the test and have prior Department approval.) (***NOTE**:* The tank vents are closed because it was discovered that wind flowing over open vents 12 feet high can interfere with the pressure measurements, even with the drybreaks open. Since the Pressure Decay/Leak Test must be conducted first, the caps and relief valve are usually already in place.)

iii. If there is no remote check valve in the dispenser, proceed to Step d.1.iv., below. If the Stage II balance system employs a remote vapor check valve that can be disabled by removing the poppet on the fuel side, carefully open the fuel side of the remote vapor check valve and remove the poppet. Replace the threaded plug on the fuel side of the valve.

iv. Connect the pressure drop test device to the vapor return piping and the regulated nitrogen source. If the nitrogen is introduced through the vapor recovery nozzle, apply a film of lubricant to the faceplate of the nozzle to be tested and insert the nozzle into the fillpipes simulator of the test device. The nozzle must fit tightly.

v. Zero the pressure gauges.

vi. Adjust the pressure regulators and the pressure drop panel flow control valve to produce a nitrogen flow rate of 20 SCFH. Record the backpressure (balance system pressure drop) measured immediately upstream of the vapor piping, i.e., at the entrance to the nozzle, on a data form acceptable to the Department.

vii. Repeat Step d.1.vi., above, with flow rates of 60 SCFH and 100 SCFH.

viii. If the system failed to meet the criteria for passage set forth below in Section e.1., make necessary replacements of or adjustment to the nozzles, vapor hoses, swivels, dispenser

piping, or underground piping to bring the measured pressure drops within the appropriate standard.

ix. After completion of the Dynamic Backpressure (Dry) Test, close and cap the underground storage tank vapor drybreak valves and remove the closures from the tank vent pipes.

x. For Stage II balance systems with remote vapor check valves, carefully reassemble the remote vapor check valve by removing the plug on the fuel side and reinserting the fuel poppet. Replace the threaded fuel plug.

2. Liquid Blockage (Wet) Test: Each dispensing nozzle/vapor return piping inlet shall be tested using the following procedure unless otherwise instructed by the Department. Testing shall be done starting with the farthest dispensing nozzle from the underground storage tanks for each product.

i. Prop open only the vapor drybreak valve at the tank with the same product as the nozzle being tested. Set up traffic barriers in the vicinity of the drybreak valve to preclude the approach of potential ignition sources.

ii. Install a pressure relief safety valve set at a maximum cracking pressure of one pound per square inch gauge (27.7 inches wcg) at the vent of one of the storage tanks. If the system has manifolded vapor piping, cap the vents of the other storage tanks. If the system has non-manifolded piping, be sure the pressure relief valve is on the tank that has the same product as that which is dispensed at the location where liquid is introduced to the vapor piping.

iii. For each nozzle, introduce gasoline into the vapor piping inlet located at or in each dispenser. (Don't introduce gasoline through the vapor return nozzle and vapor hose.) Have someone listening at the open Stage I drybreaks to identify the tank where liquid splashing is heard. For systems with manifolded underground vapor piping, the liquid must drop into the leaded product tank, or the lowest octane unleaded tank if there is no leaded product. For non-manifolded systems with separate underground vapor piping, the liquid shall return to the tank that has the same product as is dispensed at the nozzle where the liquid was introduced into the vapor piping. If the product at the nozzle does not match the product in the tank, the underground piping is crossed and

the system fails the test. For both manifolded and non-manifolded systems, the piping must be the same as the configuration approved in the CARB Executive Orders (see **Appendix "J"**) or the facility fails the test.

iv. Restore the dispensing/vapor return system to its normal balance system configuration.

v. If there is no remote check valve in the dispenser, proceed to Step d.2.vi., below. If the Stage II balance system employs a remote vapor check valve that can be disabled by removing the poppet on the fuel side, carefully open the fuel side of the remote vapor check valve and remove the fuel poppet. Replace the threaded plug on the fuel side of the valve.

vi. Connect the pressure drop test device to the vapor return piping and the regulated nitrogen source. If the nitrogen is introduced through the vapor recovery nozzle, apply a file of lubricant to the faceplate of the nozzle to be tested and insert the nozzle into the fillpipe simulator of the test device. The nozzle must fit tightly.

vii. Zero the pressure gauges.

viii. Adjust the pressure regulators and the pressure drop panel flow control valve to produce a nitrogen flow rate of 60 SCFH. Note the response and reading of the pressure gauge immediately upstream of the vapor piping, i.e., at the entrance to the nozzle. Record the backpressure reading on a data form acceptable to the Department.

ix. If during the "Wet Test" the backpressure gauge pegs at full scale or continuously fluctuates, note this in the "Comments" section for the nozzle being tested.

x. If the system failed to meet the criteria for passage set forth below in Section e.2., make necessary repairs or adjustments to the tested piping to eliminate the blockage.

xi. For Stage II balance systems with remote vapor check valves, carefully reassemble the remote vapor check valve by removing the plug on the fuel side and reinserting the fuel poppet. Replace the threaded fuel plug.

xii. Repeat Steps d.2.i. through d.2.xi. for each nozzle/vapor return piping inlet associated with the vapor return line being tested.

xiii. After completion of the Liquid Blockage (Wet) Test for all nozzles connected to the vapor return line, close and cap the underground storage tank vapor drybreak valves and remove the closures from the tank vent pipes.

e. TEST STANDARDS

1. Dynamic Backpressure (Dry) Test: The system passes the Dynamic Backpressure (Dry) Test if at the nitrogen flow rates of 20, 60, and 100 SCFH, the flow resistance measured does not exceed the following pressure limits:

i. 0.15 inches of water gauge at 20 SCFH
ii. 0.45 inches of water gauge at 60 SCFH
iii. 0.95 inches of water gauge at 100 SCFH

2. Liquid Blockage (Wet) Test: The system fails if the backpressure gauge pegs at full scale or continuously fluctuates during the "Wet Test", or if the "Wet Test" backpressure reading at 60 SCFH flow rate exceeds the maximum standard of 0.45 inches of water gauge prescribed in the applicable CARB Executive Orders.

f. REPORTING REQUIREMENTS. The owner shall submit a copy of the results of all test failures to the Department within ten (10) working days of the test. It is the ultimate responsibility of the owner of the facility to make sure that the necessary documentation is submitted to the Department; however, the Department will accept test documentation directly from the contractor performing the tests. It is also the owner's responsibility to see that test results are maintained in a file at the gasoline dispensing facility.

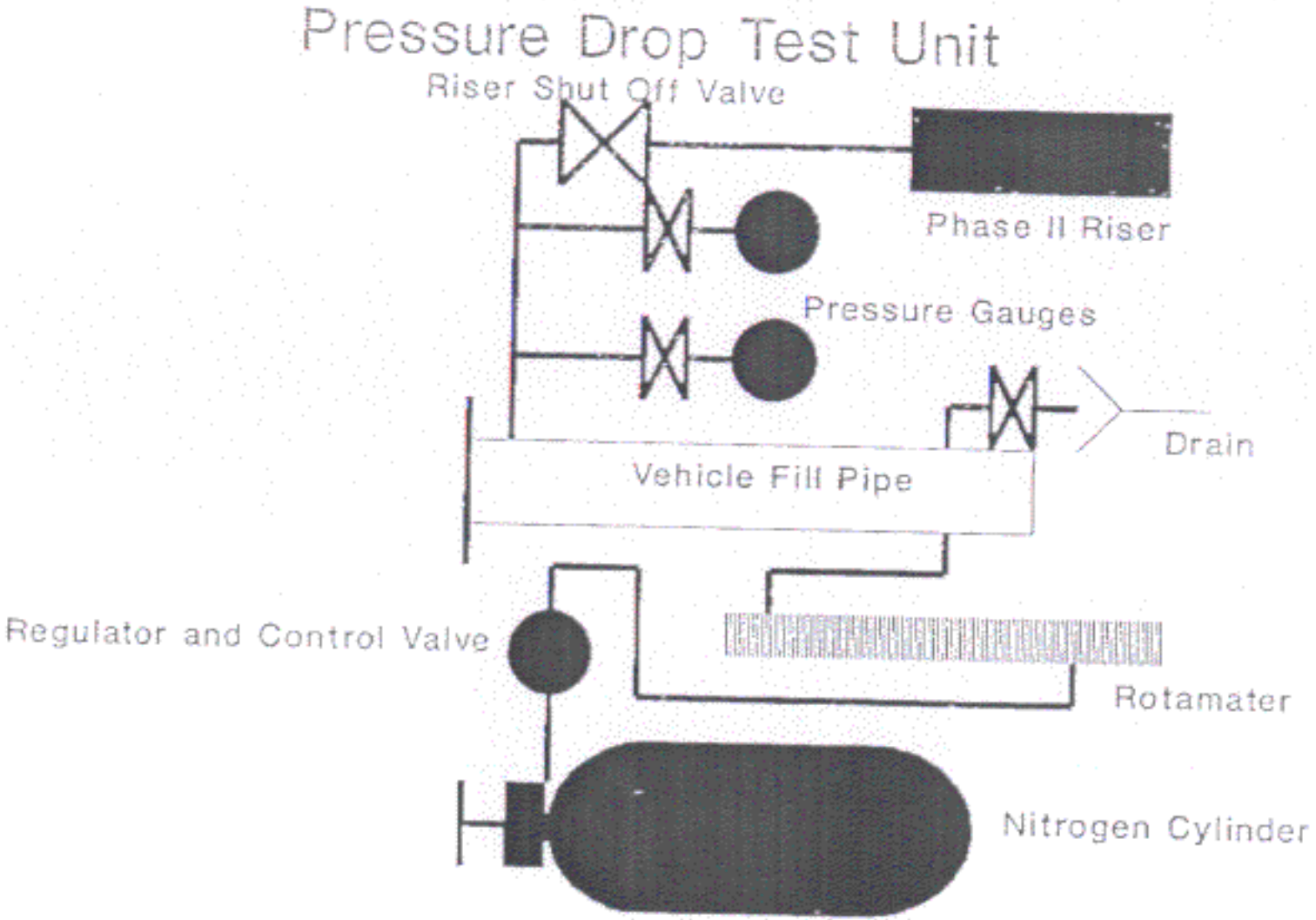

FIGURE 1.